

SMAP Data Access and Analysis

Erika Podest

2 December 2017

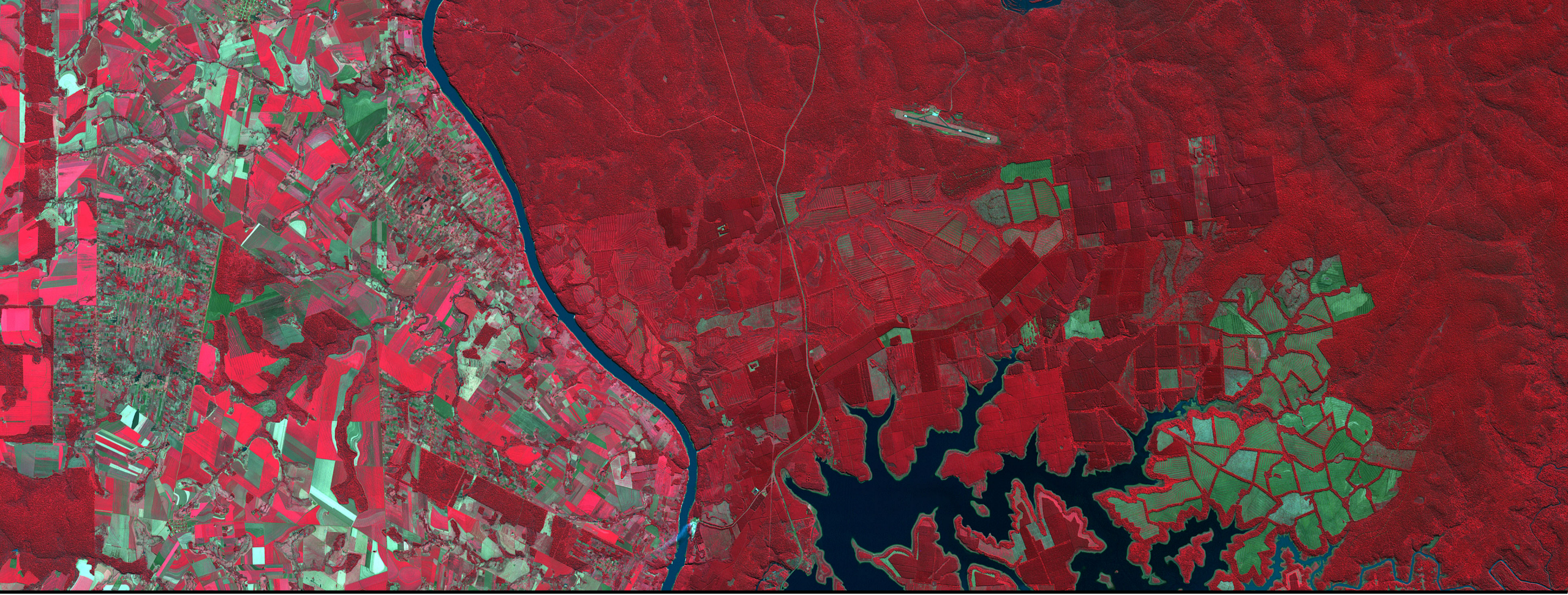
Objectives

By the end of this exercise, you will be able to:

- Access SMAP data
- Visualize and analyze SMAP data

Outline

- SMAP Data Products
 - SMAP Data Product Summary
 - Product Configuration
- Discover, Download, and Visualize SMAP Data
 - Sites
 - Tools
- Download SMAP Data
- SMAP Data Analysis
 - Extracting SMAP Soil Moisture Values
 - Open the File



SMAP Data Products

SMAP Data Products

Data Product Short Name	Description	Grid Resolution	Granule Extent
L1A_Radar*	Parsed Radar Instrument Telemetry		Half Orbit
L1A_Radiometer	Parsed Radiometer Instrument Telemetry		Half Orbit
L1B_S0_LoRes*	Low resolution Radar σ_0 in Time Order	5x30 km (10 slices)	Half Orbit
L1C_S0_HiRes*	High Resolution Radar σ_0 on Swath Grid	1 km	Half Orbit
L1B_TB	Radiometer T_B in Time Order	39 x 47 km	Half Orbit
L1C_TB	Radiometer T_B	36 km	Half Orbit
L2_SM_A*	Radar Soil Moisture (includes Freeze-Thaw)	3 km	Half Orbit
L2_SM_P	Radiometer Soil Moisture	36 km	Half Orbit
L2_SM_AP*	Active-Passive Soil Moisture	9 km	Half Orbit
L3_FT_A*	Daily Global Composite Freeze/Thaw State	3 km	North of 45° N
L3_SM_A*	Daily Global Composite Radar Soil Moisture	3 km	Global
L3_SM_P	Daily Global Composite Radiometer Soil Moisture	36 km	Global
L3_SM_AP*	Daily Global Composite Active-Passive Soil Moisture	9 km	Global
L4_SM	Surface & Root Zone Soil Moisture	9 km	Global
L4_C	Carbon Net Ecosystem Exchange	9 km	North of 45° N

*Only available during the 2.5 months of radar operation (mid-April – July 7, 2015)



SMAP Data Product Summary

Updated SMAP Data Products

Data Product	Description	Grid Resolution	Algorithm Source
L1A_Radiometer	Radiometer Data in Time-Order	-	Mission DA
L1B_TB	Radiometer T_B in Time Order	39 x 47 km	Mission DA
L1C_TB	Radiometer T_B in Half-Orbits	36 km	Mission DA
L1C_TB_E	Radiometer T_B in Half-Orbits, Enhanced	9 km	Mission DA
L2_SM_P	Soil Moisture (Radiometer)	36 km	Mission DA
L2_SM_P_E	Soil Moisture (Radiometer)	9 km	Mission DA
L2_SM_SP	Soil Moisture (Sentinel Radar + Radiometer)	3 km	Mission DA
L3_FT_P	Soil Moisture (Radiometer)	36 km	Mission DA
L3_SM_P_E	Soil Moisture (Radiometer, Enhanced)	3 km	Mission DA
L3_SM_P	Soil Moisture (Radiometer)	36 km	Mission DA
L3_SM_P_E	Soil Moisture (Radiometer, Enhanced)	9 km	Mission DA
L4_SM	Soil Moisture (Surface & Root Zone)	9 km	Mission DA
L4_C	Carbon Net Ecosystem Exchange (NEE)	9 km	Mission DA



SMAP Product Configuration

- **All products are in HDF5 format**
 - Each SMAP HDF5 file contains the primary data parameters (e.g., soil moisture, freeze/thaw, sensor data) and all data used in the production of those parameters
 - Files also include metadata, geolocation information, quality flags, etc.
- **Projection: EASE-Grid 2.0**
 - Equal-area projection
 - Level 2, 3, 4, and radiometer L1C are in this projection
- **Values**
 - Radiometer data (brightness temperature) is in Kelvin
 - Radar data is in sigma naught
 - Soil moisture is a volumetric measurement expressed as cm³/cm³
 - Freeze/thaw is a binary measurement, either frozen or thawed
 - Net ecosystem exchange is in grams of carbon/square meter per day





Discover, Download,
and Visualize SMAP Data

Sites to Discover, Download, and Visualize SMAP Data

NSIDC: Data Search,
Documentation, &
Access

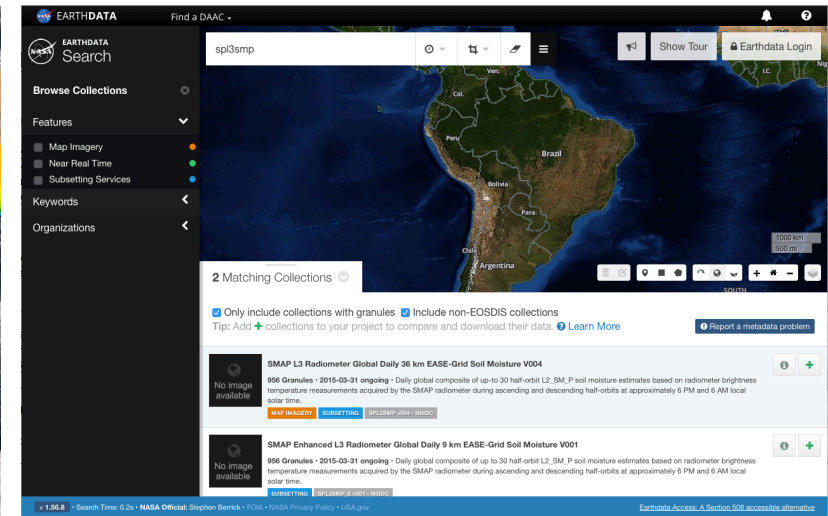
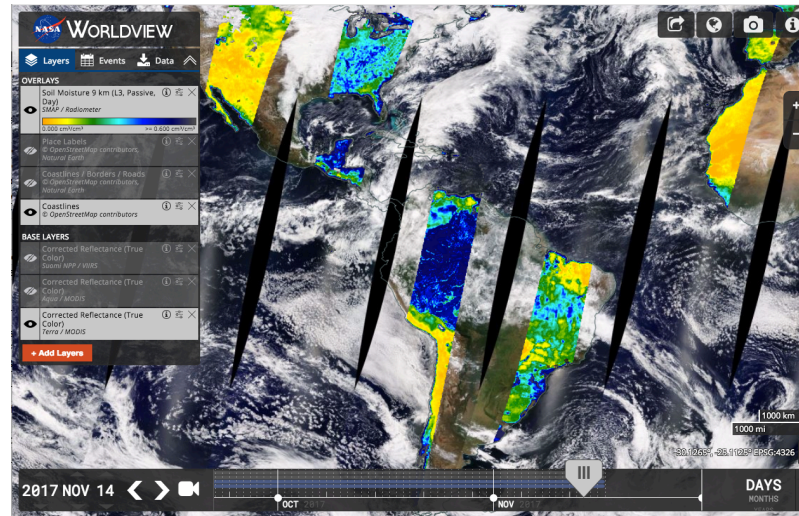
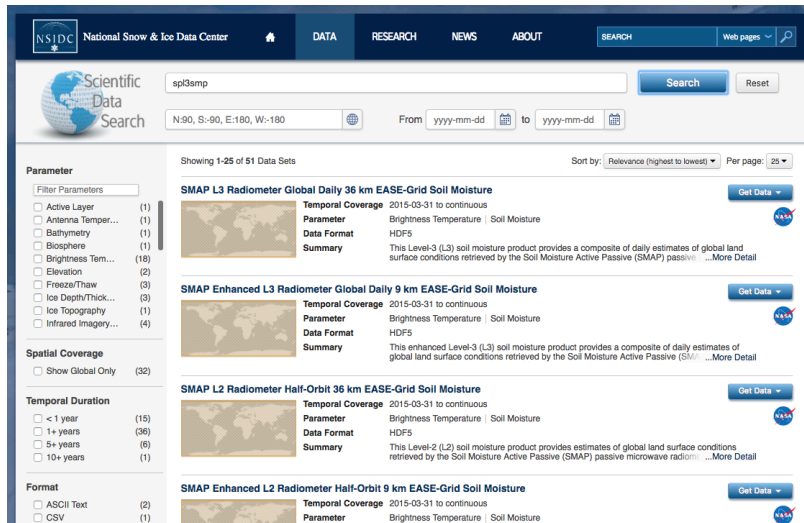
[http://nsidc.org/data/
search/](http://nsidc.org/data/search/)

Worldview:
Data Visualization and
Download

[http://worldview.
earthdata.nasa.gov/](http://worldview.earthdata.nasa.gov/)

Earthdata:
Data Access & Output
Customization

[http://search.earthdata
.nasa.gov/](http://search.earthdata.nasa.gov/)



National Snow & Ice Data Center (NSIDC)

<http://nsidc.org/data/smap/>

- Provides access to L1 radiometer data and all L2, L3, and L4 radiometer products
- Provides data access, dataset user guide documents, tools, news, published research, quality information, FAQs, and many other resources
- Direct access to SMAP data (with logins) through:
 - HTTPS: <https://n5eil01u.ecs.nsidc.org/SMAP/>
- Subscribe here: <http://nsidc.org/daac/subscriptions.html> for an automatic delivery of data as it becomes available



Worldview

<http://worldview.earthdata.nasa.gov>

- Data visualization and download
- Imagery is generally available within several hours
- Image output in JPEG, PNG, GeoTIFF, and KML

Earthdata Search

<http://search.earthdata.nasa.gov/>

- Allows you to search, order, and visualize all SMAP data
- You can perform a keyword, spatial, or temporal search
- Reformats, reprojects, and subsets services for most products



Tools

The HDF5 Group Support: http://support.hdfgroup.org/products/hdf5_tools/

Allows you to access and visualize SMAP HDF5 data using Python, NCL, MATLAB®, and IDL®

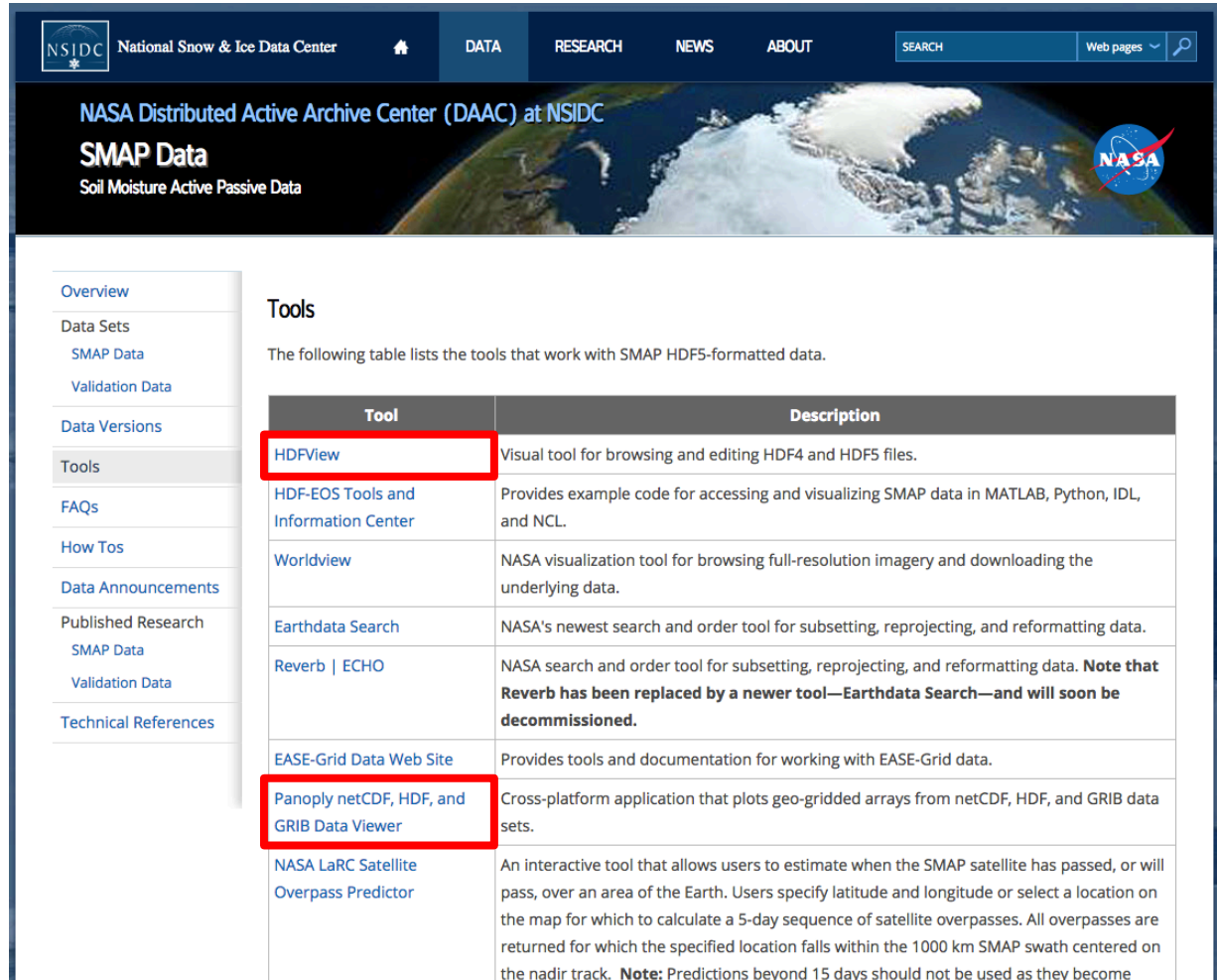
- Access HDF5 tools:
 - http://support.hdfgroup.org/products/hdf5_tools/index.html
- Download code in Python, NCL, MATLAB®, and IDL®:
 - http://hdfeos.org/zoo/index_openNSIDC_Examples.php#SMAP



Tools That Work with SMAP HDF5-Formatted Data

<http://nsidc.org/data/smap/tools>

- The native format of SMAP Data files is HDF5. NSIDC offers a tools page with a couple of tools for easy viewing of the HDF5 files: Panoply and HDFView
 - http://support.hdfgroup.org/products/hdf5_tools/index.html
- download code in Python, NCL, MATLAB®, and IDL®:
 - http://hdfeos.org/zoo/index_openNSIDC_Examples.php#SMAP



The screenshot shows the NSIDC website's 'Tools' page for SMAP data. The page header includes the NSIDC logo, 'National Snow & Ice Data Center', and navigation links for DATA, RESEARCH, NEWS, and ABOUT. A search bar and 'Web pages' dropdown are also present. The main banner features a satellite image of Earth with the text 'NASA Distributed Active Archive Center (DAAC) at NSIDC', 'SMAP Data', and 'Soil Moisture Active Passive Data'. A left sidebar contains a navigation menu with links to Overview, Data Sets (SMAP Data, Validation Data), Data Versions, Tools (highlighted), FAQs, How Tos, Data Announcements, Published Research (SMAP Data, Validation Data), and Technical References. The main content area is titled 'Tools' and states: 'The following table lists the tools that work with SMAP HDF5-formatted data.' Below this is a table with two columns: 'Tool' and 'Description'. The table lists several tools, with 'HDFView' and 'Panoply netCDF, HDF, and GRIB Data Viewer' highlighted by red boxes.

Tool	Description
HDFView	Visual tool for browsing and editing HDF4 and HDF5 files.
HDF-EOS Tools and Information Center	Provides example code for accessing and visualizing SMAP data in MATLAB, Python, IDL, and NCL.
Worldview	NASA visualization tool for browsing full-resolution imagery and downloading the underlying data.
Earthdata Search	NASA's newest search and order tool for subsetting, reprojecting, and reformatting data.
Reverb ECHO	NASA search and order tool for subsetting, reprojecting, and reformatting data. Note that Reverb has been replaced by a newer tool—Earthdata Search—and will soon be decommissioned.
EASE-Grid Data Web Site	Provides tools and documentation for working with EASE-Grid data.
Panoply netCDF, HDF, and GRIB Data Viewer	Cross-platform application that plots geo-gridded arrays from netCDF, HDF, and GRIB data sets.
NASA LaRC Satellite Overpass Predictor	An interactive tool that allows users to estimate when the SMAP satellite has passed, or will pass, over an area of the Earth. Users specify latitude and longitude or select a location on the map for which to calculate a 5-day sequence of satellite overpasses. All overpasses are returned for which the specified location falls within the 1000 km SMAP swath centered on the nadir track. Note: Predictions beyond 15 days should not be used as they become



Tools That Work with SMAP HDF5-Formatted Data

<http://nsidc.org/data/smap/tools>

- For the SPL3SMP collection, Earthdata Search service options allow for the reformatting of the native HDF5 files to:
 - GeoTIFF, ASCII, NetCDF-3, NetCDF4-CF, KML, and HDF-EOS5
- For a detailed table of what subsetting, reformatting, and reprojection services are available for SMAP collections, please see:
 - <https://support.nsidc.org/entries/97456598-What-data-subsetting-reformatting-and-reprojection-services-are-available-for-SMAP-data->



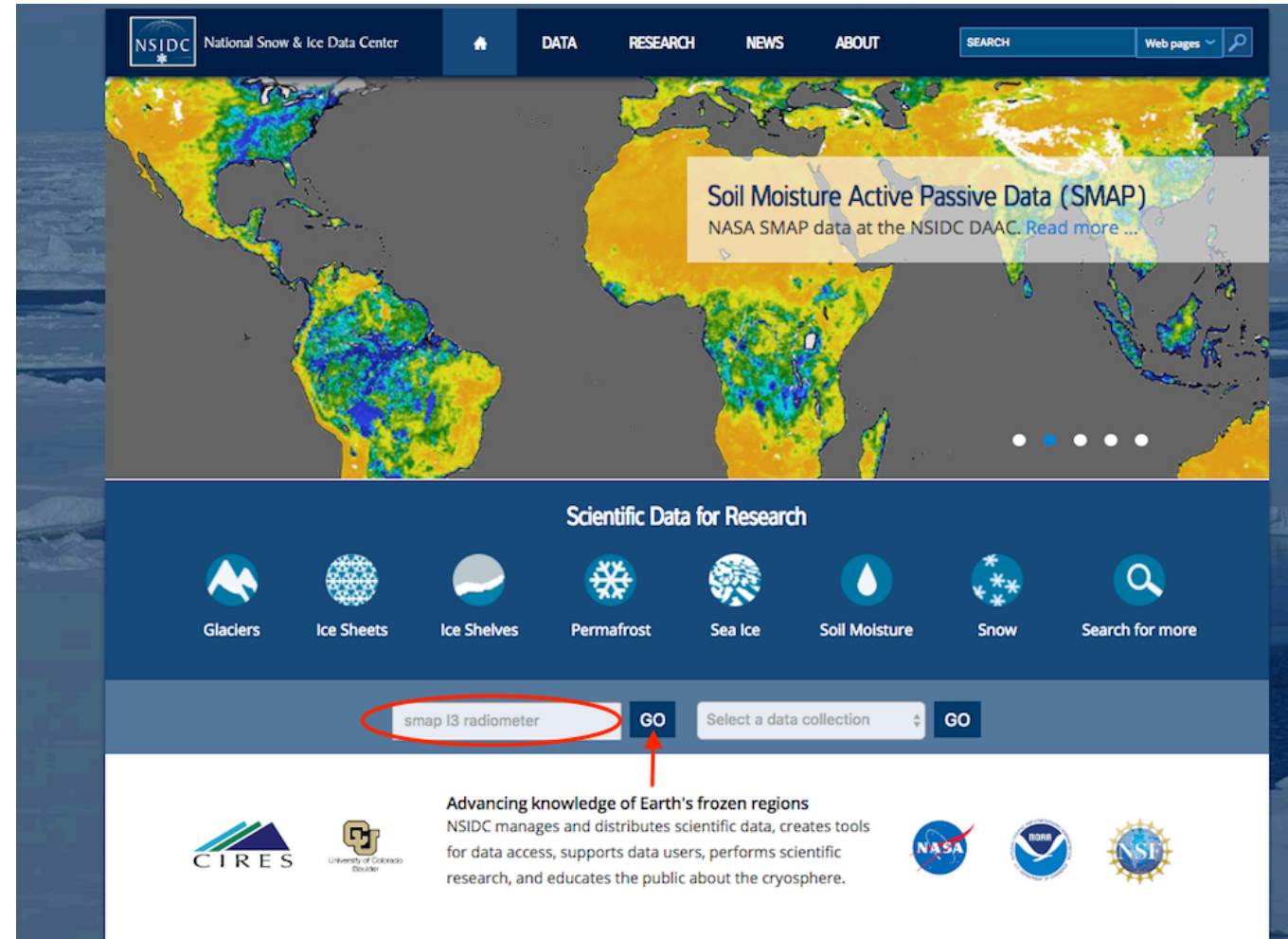


Download SMAP Data

Discovering SMAP Data at NSIDC

<http://nsidc.org/>

- NASA National Snow & Ice Data Center (NSIDC) is a Distributed Active Archive Center (DAAC)
- 1 of 12 NASA Earth Observing System Data and Information System (EOSDIS) DAACs
- Distributes nearly 500 NASA data sets
 - primarily focused on the cryosphere



Discovering SMAP Data at NSIDC

<http://nsidc.org>

Clicking on the data set name in the Search results will take you to the collection's catalog page

NSIDC National Snow & Ice Data Center

DATA RESEARCH NEWS ABOUT

SEARCH Web pages

Scientific Data Search

smap l3 radiometer

N:90, S:-90, E:180, W:-180

From yyyy-mm-dd to yyyy-mm-dd

Showing 1-8 of 8 Data Sets

Sort by: Relevance (highest to lowest) Per page: 25

Parameter

- ☐ Biosphere (1)
- ☐ Brightness Tem... (3)
- ☐ Microwave Imag... (1)
- ☐ Radar Properties (1)
- ☐ Soil Moisture/W... (8)

Spatial Coverage

- ☐ Show Global Only (8)

Temporal Duration

- ☐ < 1 year (1)
- ☐ 1+ years (7)
- ☐ 5+ years (1)

Format

- ☐ HDF/HDF-EOS (8)

Sensor

- ☐ AMSR-E (1)
- ☐ AQUARIUS_RA... (5)
- ☐ SMAP L-Band R... (1)
- ☐ SMAP L-Band R... (2)

Program

- ☐ NASA NSIDC D... (8)

SMAP L3 Radar/Radiometer Global Daily 9 km EASE-Grid Soil Moisture

Temporal Coverage 2015-04-13 to 2015-07-07

Parameter Brightness Temperature | Sigma Nought | Soil Moisture

Data Format HDF5

Summary This Level-3 (L3) soil moisture product provides a daily composite of global land surface conditions retrieved by both the Soil Moisture Active Passive (SMAP) radar and ...More Detail

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture

Temporal Coverage 2015-03-31 to continuous

Parameter Brightness Temperature | Soil Moisture

Data Format HDF5

Summary This Level-3 (L3) soil moisture product provides a composite of daily estimates of surface conditions retrieved by the Soil Moisture Active Passive (SMAP) passive radiometer. SMAP L-band soil moisture data are resampled to a global, cylindrical Area Scalable Earth Grid, Version 2.0 (EASE-Grid 2.0).

[Less Detail](#)

AMSR-E/Aqua Daily L3 Surface Soil Moisture, Interpretive Parameters, & QC EASE-Grids

Temporal Coverage 2002-06-19 to 2011-10-03

Parameter Brightness Temperature | Microwave Imagery | Soil Moisture/Water Content | Vegetation Water Content

Data Format HDF-EOS

Summary This gridded Level-3 land surface product (AE_Land3) includes daily measurements of surface soil moisture and vegetation/roughness water content interpretive information, as well as brightness temperatures and quality control variables. Ancillary data include time, geolocation, and quality assessment.

Aquarius L3 Gridded 1-Degree Weekly Soil Moisture

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[FTP](#)
[Reverb](#)
[Worldview](#)
[Subscription](#)
[HTTPS](#)
[Earthdata Search](#)



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DATA RESEARCH NEWS ABOUT

SEARCH Web pages

Data Set ID: SPL3SMP

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture, Version 3

This Level-3 (L3) soil moisture product provides a composite of daily estimates of global land surface conditions retrieved by the Soil Moisture Active Passive (SMAP) passive microwave radiometer. SMAP L-band soil moisture data are resampled to a global, cylindrical 36 km Equal-Area Scalable Earth Grid, Version 2.0 (EASE-Grid 2.0).

Version Summary: [See more](#)

[Print version](#)

[Overview](#) [Citing These Data](#) [User Guide](#) [Support](#)

Spatial Coverage: N: 85.044, S: -85.044, E: 180, W: -180

Spatial Resolution: 36 km x 36 km

Temporal Coverage: 31 March 2015 to present

Temporal Resolution: 1 day

Parameter(s): Microwave > Brightness Temperature
Soils > Soil Moisture/Water Content > Soil Moisture

Platform(s): SMAP Observatory

Sensor(s): SMAP L-Band Radiometer

Data Format(s): HDF5

Version: V3

Data Contributor(s): O'Neill, P. E., S. Chan, E. G. Njoku, T. Jackson, and R. Bindlish.

Metadata XML: [View Metadata Record](#)

Get Data

- Download
- Visualize
- Package

Geographic Coverage

How to download data

DOWNLOADING DATA VIA FTP

Data can be downloaded through a Web browser or command line via FTP. When using a Web browser, the FTP link first directs you to an Optional Registration Form that if filled out, will allow you to receive notifications about updates or processing changes related to that specific data set. After completing the Optional Registration Form, the FTP directory becomes available. For additional help downloading data through an FTP client, go to User Services Online Support: FTP Client Data Access Web page.

FTP

DOWNLOADING DATA VIA HTTPS

Downloading data via HTTPS requires registration with NASA Earthdata Login. Once you have registered and logged in, data can be downloaded via a Web browser, command line, or client. Your NASA Earthdata Login will work at other NASA Earth Observing System Data and Information System (EOSIS) Web sites, such as NASA Earthdata and NASA Reverb.

HTTPS

Get Data: Visualize

Worldview: This application allows you to interactively browse global satellite imagery within hours of it being acquired. You can also save it, share it, and download the underlying data.

Get Data: Package

Reverb: NASA search and order tool for subsetting, reprojecting, and reformatting data.

NOTE: Reverb will be decommissioned in the coming months and replaced with Earthdata Search. All links to Reverb will be removed at that time.

Subscription Service: Subscribe to have new data automatically sent when the data become available.

Earthdata Search: NASA's newest search and order tool for subsetting, reprojecting, and reformatting data.

From the catalog page, you can use the **Get Data** options to explore options to download, visualize, and customize your data order

You'll also notice there's an overview of the data in the collection. Clicking on the different tabs will highlight how to cite this data, provide you with a user guide, and how to reach NSIDC for support



Discovering SMAP Data at NSIDC

<http://nsidc.org/>

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DATA RESEARCH NEWS ABOUT

SEARCH Web pages

Data Set ID: SPL3SMP

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture, Version 3

This Level-3 (L3) soil moisture product provides a composite of daily estimates of global land surface conditions retrieved by the Soil Moisture Active Passive (SMAP) passive microwave radiometer. SMAP L-band soil moisture data are resampled to a global, cylindrical 36 km Equal-Area Scalable Earth Grid, Version 2.0 (EASE-Grid 2.0).

Version Summary: [See more](#)

Print version

Overview **Citing These Data** User Guide Support

Data Citation

As a condition of using these data, you must cite the use of this data set using the following citation. For more information, see our [Use and Copyright](#) Web page.

O'Neill, P. E., S. Chan, E. G. Njoku, T. Jackson, and R. Bindlish. 2016. *SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture, Version 3*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. doi: <http://dx.doi.org/10.5067/7MINGDCZTES>. [Date Accessed].

Find Data Stay Current Learn About Snow and Ice Get Help

Search NSIDC Data Arctic Sea Ice News and Analysis Icelights: Answers to Your Questions Knowledge Base

Reverb (NASA) Sea Ice Index (Passive microwave satellite data) Cryosphere Quick Facts Ask Us

IceBridge Portal MASIE (Daily sea ice extent, multi-source) All About Glaciers Etc.

Data Pool (Direct FTP for select data) All About Snow Use & Copyright

Data Collections List Greenland Today All About Sea Ice Web Policy

Newsroom Arctic Climatology - A Primer Jobs

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NSIDC NASA Earth System Science Data Center

Version Summary: [See less](#)

Changes to this version include:

- Transitioned to Validated-Stage 2
- Uses updated SPL2SMP V3 Validated data as input version

Print version

Overview Citing These Data **User Guide** Support

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Collapse All / Open All

Detailed Data Description

Parameter Description

Surface soil moisture (0-5 cm) in cm^3/cm^3 derived from brightness temperatures is output on a fixed 36-km EASE-Grid 2.0.

Brightness temperature (TB) is a measure of the radiance of the microwave radiation welling upward from the top of the atmosphere to the satellite. The SMAP L-Band Radiometer measures four brightness temperature Stokes parameters: TH, TV, T3, and T4 at 1.41 GHz. TH and TV are the horizontally and vertically polarized brightness temperatures, respectively, and T3 and T4 are the third and fourth Stokes parameters, respectively.

Refer to the [Data Fields](#) document for details on all parameters.

Format

Data are in HDF5 format. For software and more information, including an HDF5 tutorial, visit the HDF Group's [HDF5](#) Web site.

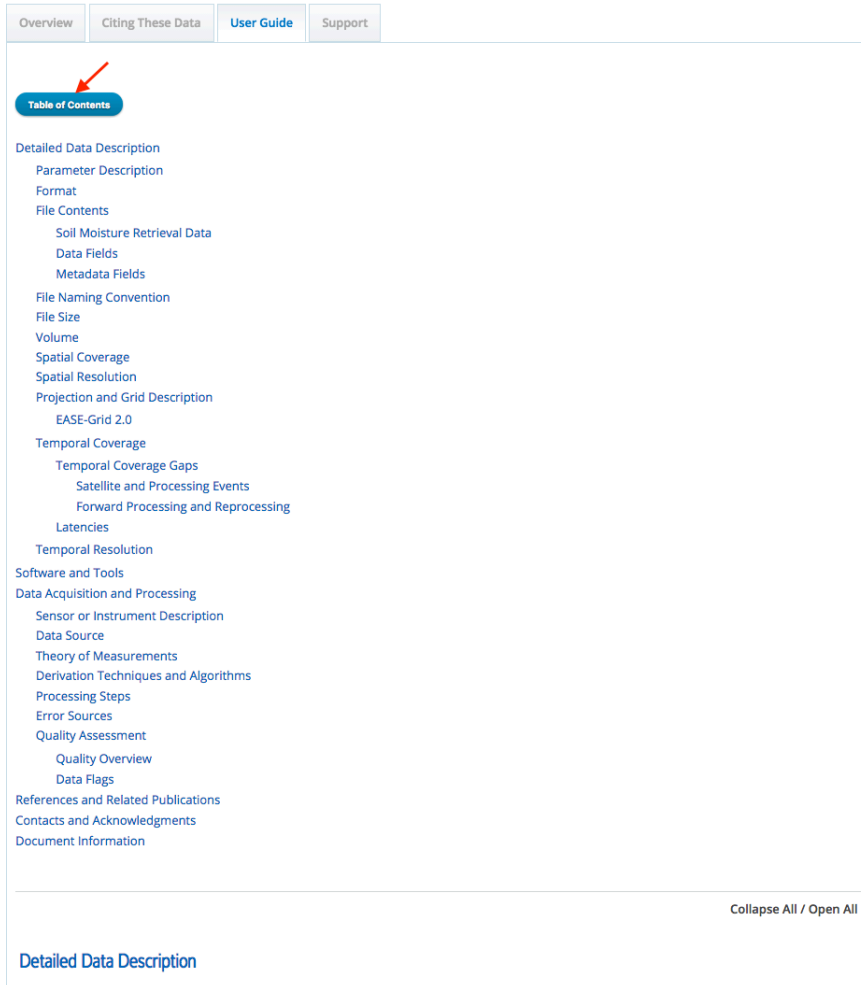
File Contents

As shown in Figure 1, each HDF5 file is organized into the following main groups, which contain additional groups and/or data sets:



Discovering SMAP Data at NSIDC

<http://nsidc.org>



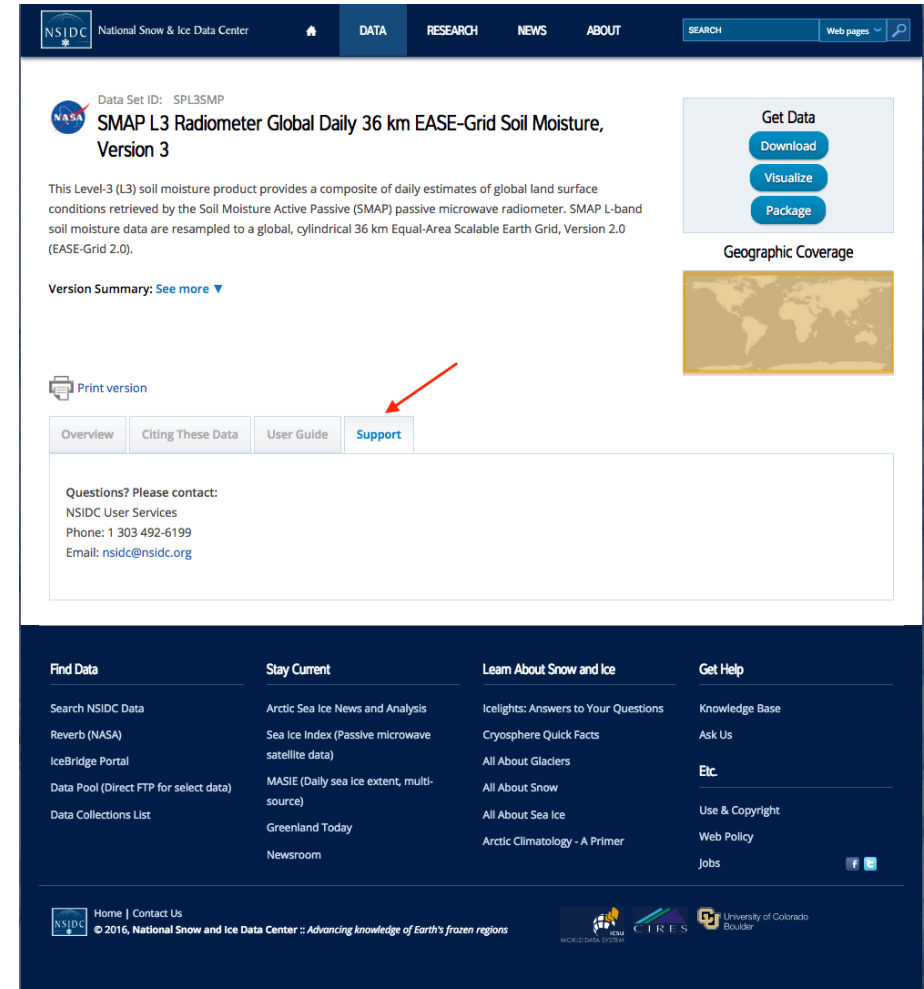
Overview Citing These Data **User Guide** Support

Table of Contents

- Detailed Data Description
 - Parameter Description
 - Format
 - File Contents
 - Soil Moisture Retrieval Data
 - Data Fields
 - Metadata Fields
 - File Naming Convention
 - File Size
 - Volume
 - Spatial Coverage
 - Spatial Resolution
 - Projection and Grid Description
 - EASE-Grid 2.0
 - Temporal Coverage
 - Temporal Coverage Gaps
 - Satellite and Processing Events
 - Forward Processing and Reprocessing
 - Latencies
 - Temporal Resolution
- Software and Tools
- Data Acquisition and Processing
 - Sensor or Instrument Description
 - Data Source
 - Theory of Measurements
 - Derivation Techniques and Algorithms
 - Processing Steps
 - Error Sources
 - Quality Assessment
 - Quality Overview
 - Data Flags
- References and Related Publications
- Contacts and Acknowledgments
- Document Information

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[Detailed Data Description](#)



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DATA RESEARCH NEWS ABOUT

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Data Set ID: SPL3SMP

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture, Version 3

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Get Data
Download
Visualize
Package

Geographic Coverage

Version Summary: [See more](#)

Print version

Overview Citing These Data User Guide **Support**

Questions? Please contact:
NSIDC User Services
Phone: 1 303 492-6199
Email: nsidc@nsidc.org

Find Data	Stay Current	Learn About Snow and Ice	Get Help
Search NSIDC Data	Arctic Sea Ice News and Analysis	Icelights: Answers to Your Questions	Knowledge Base
Reverb (NASA)	Sea Ice Index (Passive microwave satellite data)	Cryosphere Quick Facts	Ask Us
IceBridge Portal	MASIE (Daily sea ice extent, multi-source)	All About Glaciers	Etc.
Data Pool (Direct FTP for select data)	Greenland Today	All About Snow	Use & Copyright
Data Collections List	Newsroom	All About Sea Ice	Web Policy
		Arctic Climatology - A Primer	Jobs

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World Data System CRES University of Colorado Boulder



Discovering SMAP Data at NSIDC

<http://nsidc.org>

Revisiting the Visualize button under Get Data, let's click Worldview and explore what this application has to offer

NSIDC National Snow & Ice Data Center

DATA RESEARCH NEWS ABOUT

SEARCH Web pages

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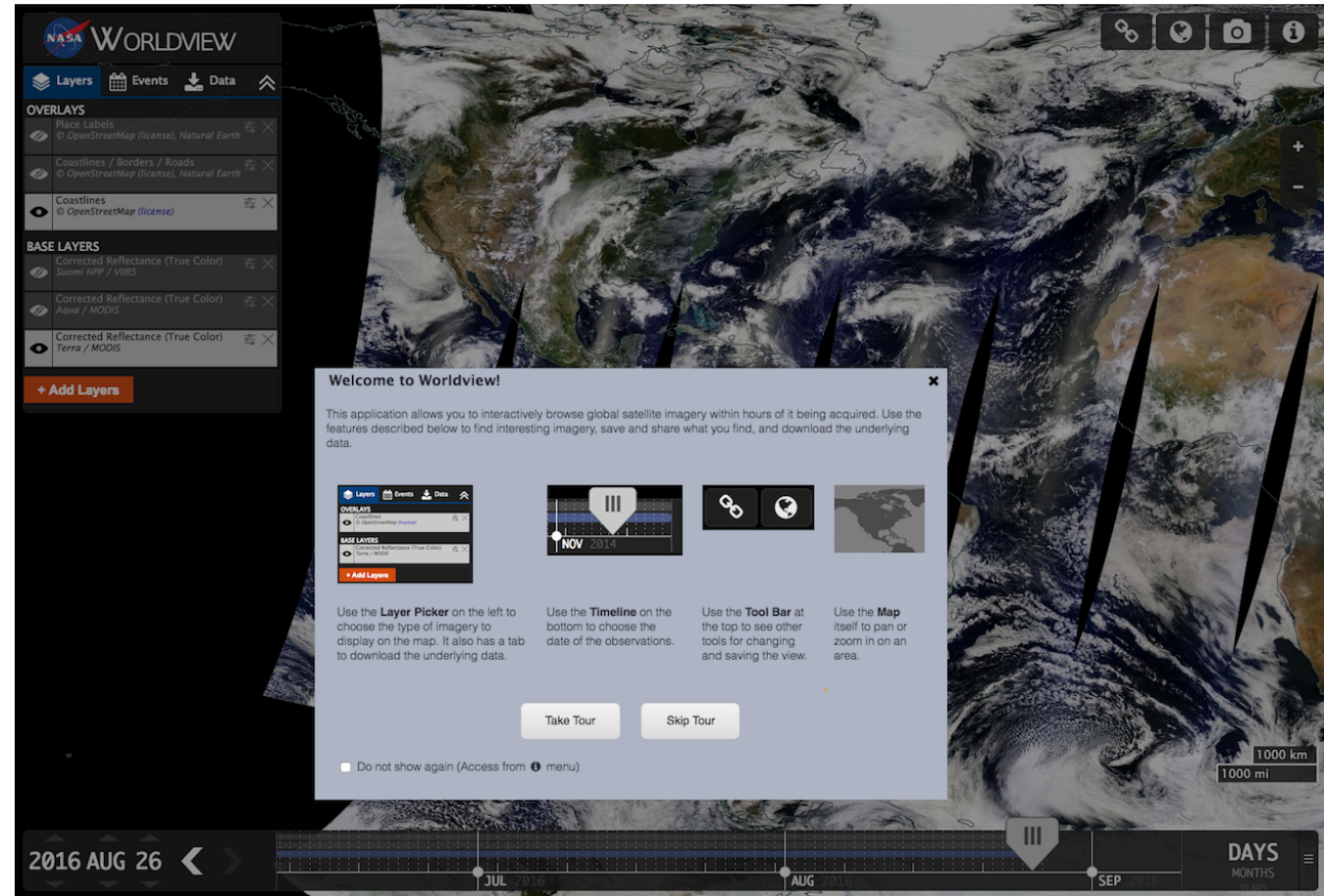
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Platform(s):	SMAP Observatory
Sensor(s):	SMAP L-Band Radiometer
Data Format(s):	HDF5
Version:	V3
Data Contributor(s):	O'Neill, P. E., S. Chan, E. G. Njoku, T. Jackson, and R. Bindlish.
Metadata XML:	View Metadata Record



Exploring SMAP Data in NASA's Worldview

<http://worldview.earthdata.nasa.gov/>

- Worldview provides you with the ability to interactively browse global, full-resolution satellite imagery and download the underlying data & image files
- Uses Global Imagery Browse Services (GIBS)
- Most of the 100+ available products are updated within 3 hrs of observation

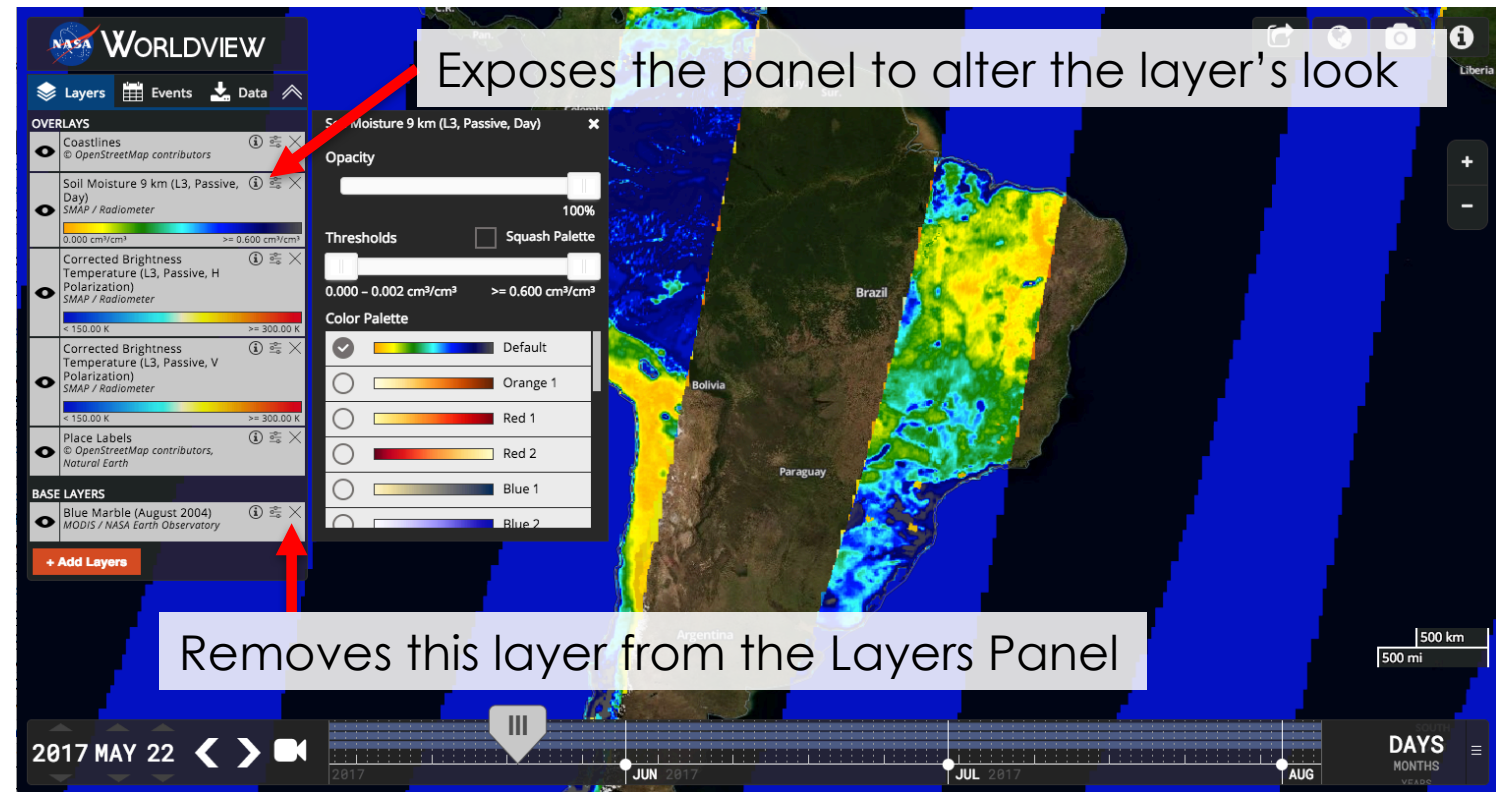


Visualizing and accessing SMAP Data from Worldview

Here, I've repositioned the Coastlines layer above Soil Moisture – notice the outlines visible in the Arctic over the Soil Moisture data

Also, clicking on the slider-bar symbol will open a dialogue to allow for changing the layer's opacity, thresholds and color palette

Clicking the “X” symbol for a layer removes it from the Layers panel



Exploring the Worldview Interface Further

The screenshot displays the NASA Worldview web application interface. The main map shows South America with several data overlays. On the left, a sidebar contains tabs for 'Layers', 'Events', and 'Data'. Below these are sections for 'OVERLAYS' and 'BASE LAYERS'. The 'OVERLAYS' section lists several data layers, each with a color-coded legend and a toggle switch. The 'BASE LAYERS' section shows the 'Blue Marble (August 2004)' layer. A red arrow points to the 'Layers' tab, another to the 'Data' tab, and a third to the 'Add Layers' button. Callout boxes provide instructions for these and other features.

Tabs for displaying current layers, current world events, or downloading underlying data

Collapse the layer pane

Turn overlay on or off

Click to browse through other layers to add

2017 MAY 22 < > [video icon]

APR 2017 MAY 2017 JUN 2017 JUL 2017

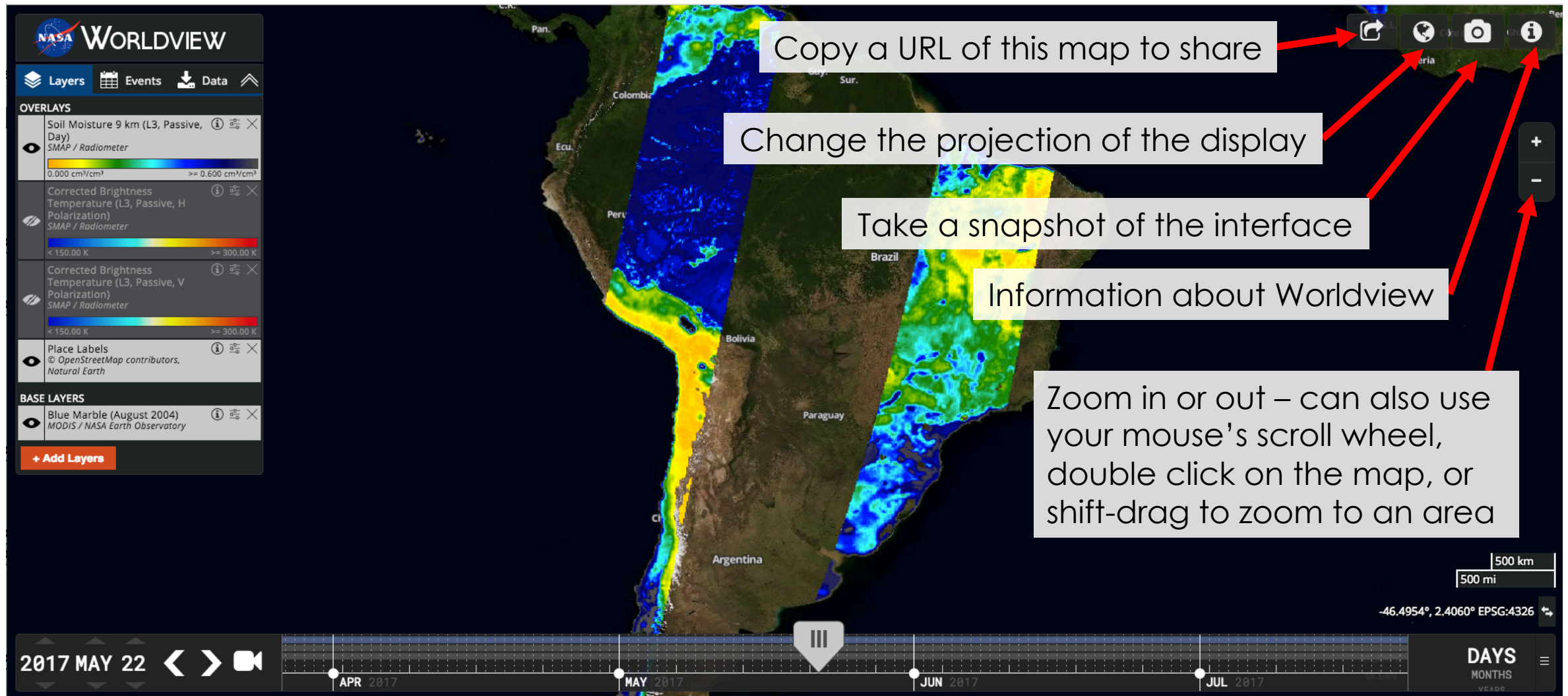
500 km 500 mi

-46.4954°, 2.4060° EPSG:4326

DAYS MONTHS YEARS



Exploring the Worldview Interface Further



Exploring the Worldview Interface Further

NASA WORLDVIEW

OVERLAYS

- Soil Moisture 9 km (L3, Passive, Day) SMAP / Radiometer
- Corrected Brightness Temperature (L3, Passive, H Polarization) SMAP / Radiometer
- Corrected Brightness Temperature (L3, Passive, V Polarization) SMAP / Radiometer

Layers

Events

Data

Change the month, day, and year of the data displayed

Advanced forward or back a day at a time

The blue line indicates the layer is on and available during this time range

Gray lines indicate layers are off, but available during this time range

Slider control to change the date of the layer displayed

Collapse the timeline

Change the timeline's finest increment shown

2017 MAY 22 < > [Camera Icon]

APR 2017 MAY 2017 JUN 2017 JUL 2017

DAYS MONTHS YEARS



Exploring Layer Options

Clicking the add layers button opens this dialogue where you can search by topic on the “Hazards and Disasters” tab or under the “Science Disciplines” tab where we are now. SMAP can be found under the Terrestrial Hydrosphere category. You may also search by keyword at the top of this dialogue by click on the “Search” text

The screenshot shows the NASA WorldView interface. At the top, there is a search bar with the text "Search" and a red arrow pointing to it. Below the search bar, there are two tabs: "Hazards And Disasters" and "Science Disciplines". The "Science Disciplines" tab is active, showing a grid of categories. The categories are: All, Atmosphere, Biosphere, Cryosphere, Human Dimensions, Land Surface, Oceans, Spectral/Engineering, and Terrestrial Hydrosphere. The "Terrestrial Hydrosphere" category is highlighted with a red arrow. Below the categories, there is a timeline showing dates from April 2016 to July 2016. On the right side of the interface, there is a map of Africa with a red arrow pointing to it.

Click and type here for a keyword search

Click this category to expand and reveal SMAP data



SMAP Layer options:

Click to reveal more details about the SMAP radiometer collections



Adding an Overlay: Coastlines / Borders / Roads

The screenshot shows the NASA WorldView web application interface. On the left, the 'LAYERS' panel is visible, showing 'OVERLAYS' and 'BASE LAYERS'. The 'OVERLAYS' section includes 'Coastlines / Borders / Roads' (selected), 'Soil Moisture 36 km (L3, Passive, Night)', and 'Soil Moisture 36 km (L3, Passive, Day)'. The 'BASE LAYERS' section includes 'Blue Marble (August 2004)'. A red arrow points to the 'Coastlines / Borders / Roads' layer in the 'Reference Map' section of the 'LAYERS' panel. The 'Reference Map' section also includes 'OpenStreetMap.org', 'Place Labels', 'Coastlines', 'Land Mask', and 'Land / Water Map'. A text box on the right explains the action: 'I've clicked on the "Other" category from the "Science Disciplines" tab and changed the default "Coastlines" layer to be "Coastlines/Borders/Roads" to add more detail to the map'. The bottom of the interface shows a timeline for May 2016 and a scale bar.

NASA WORLDVIEW

Layers Events Data

OVERLAYS

- Coastlines / Borders / Roads (selected)
- Soil Moisture 36 km (L3, Passive, Night)
- Soil Moisture 36 km (L3, Passive, Day)

BASE LAYERS

- Blue Marble (August 2004)

+ Add Layers

Search

Categories / Other

- Areas of No Data (mask)
- Blue Marble
- Global 250m Water Map
- Global Digital Elevation Map
- Latitude-Longitude Lines
- Orbital Track
- Reference Map

OpenStreetMap.org

- ☒ Coastlines / Borders / Roads
- ☐ Place Labels
- ☐ Coastlines
- ☐ Land Mask
- ☐ Land / Water Map

Coastlines/Borders/Roads

The Coastlines/Borders/Roads layer is a vector layer displaying global coastlines, country borders, first order administrative boundaries and major roads.

Coastlines/Borders/Roads information are gleaned from OpenStreetMap and Natural Earth.

2016 MAY 24

AR 2016 APR 2016 MAY 2016 JUN 2016 JUL 2016

1000 km 500 mi

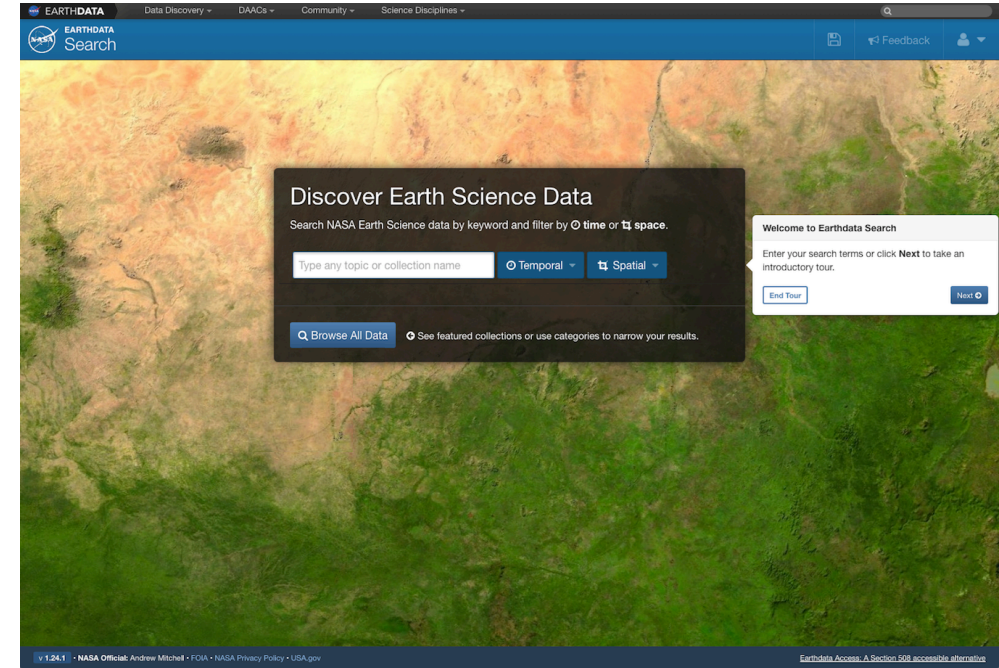
DAYS MONTHS WEEK



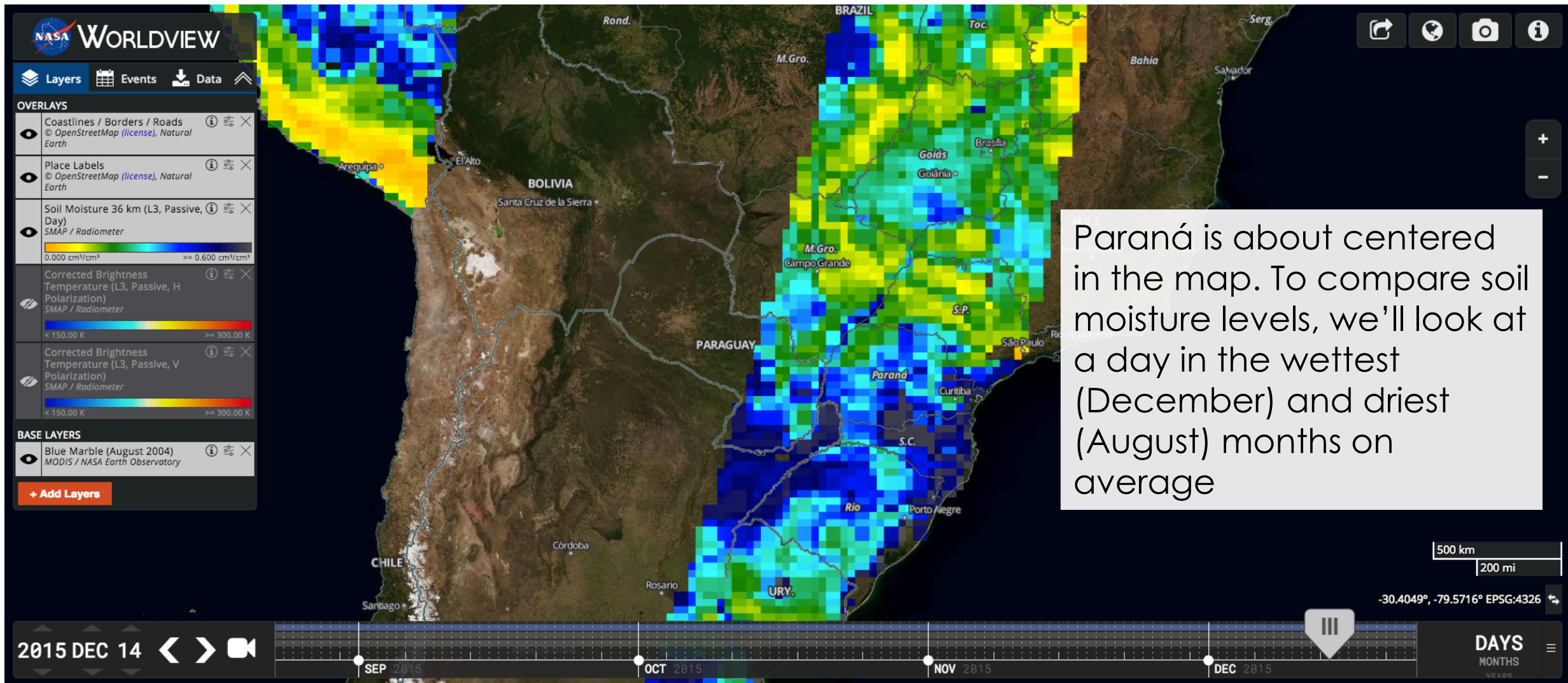
Accessing SMAP Data with NASA's Earthdata Search

<http://search.earthdata.nasa.gov/search>

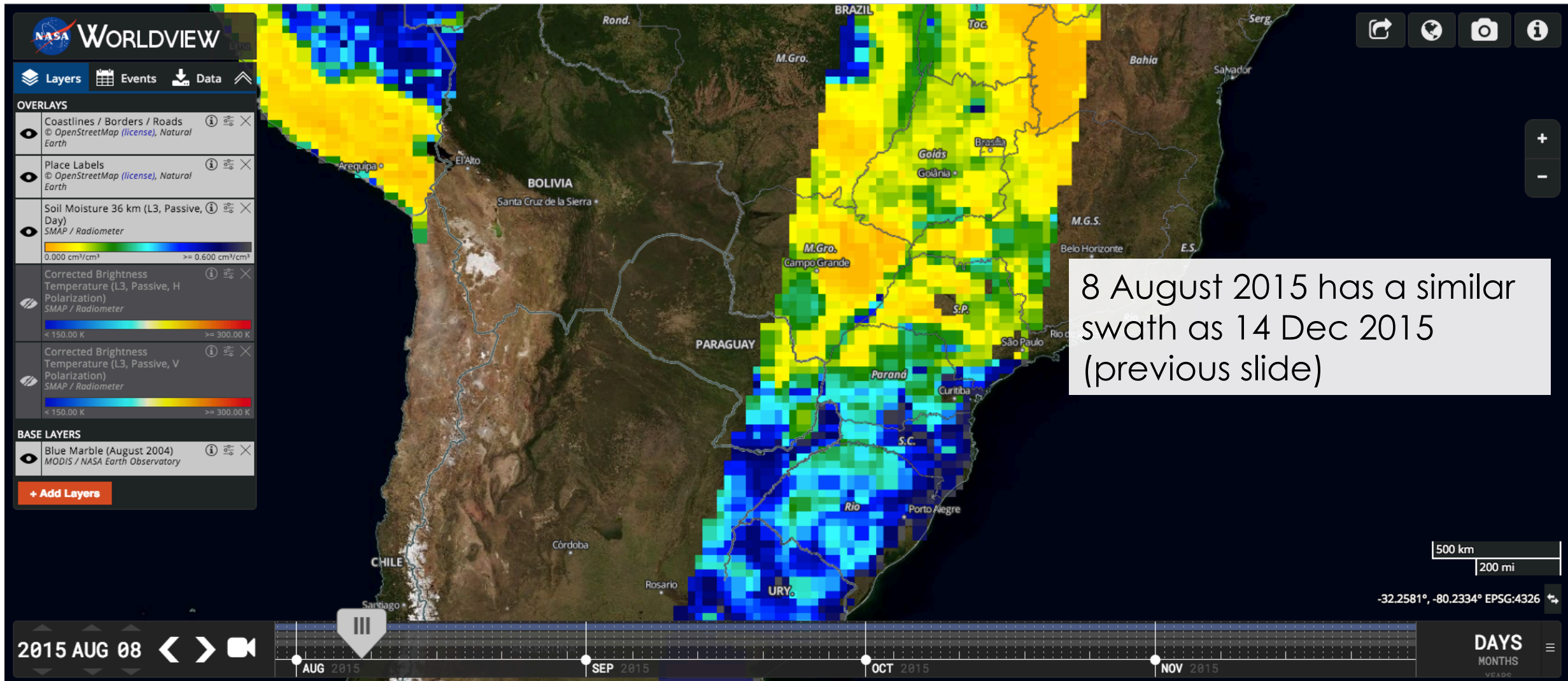
- Connects users to their data by making data search, discovery, and access available in one application
- Offers the ability to search across disciplines and DAACs
- For the last live demonstration, I'll go through
 - the interface's filtering options to hone a search for SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture (SPL3SMP)
 - available ordering and subsetting options



A Quick Comparison of Soil Moisture Across Time...

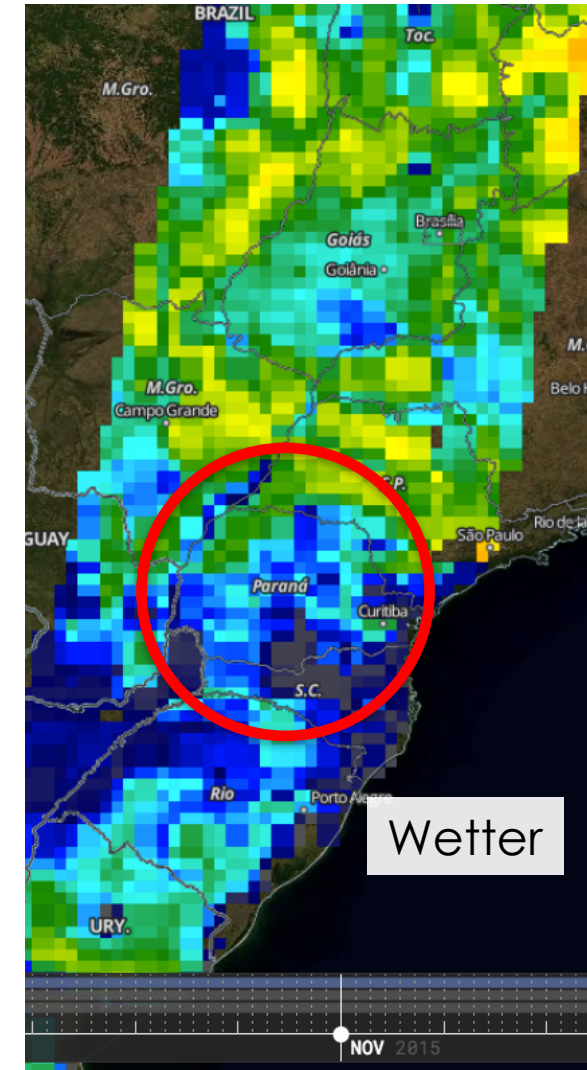
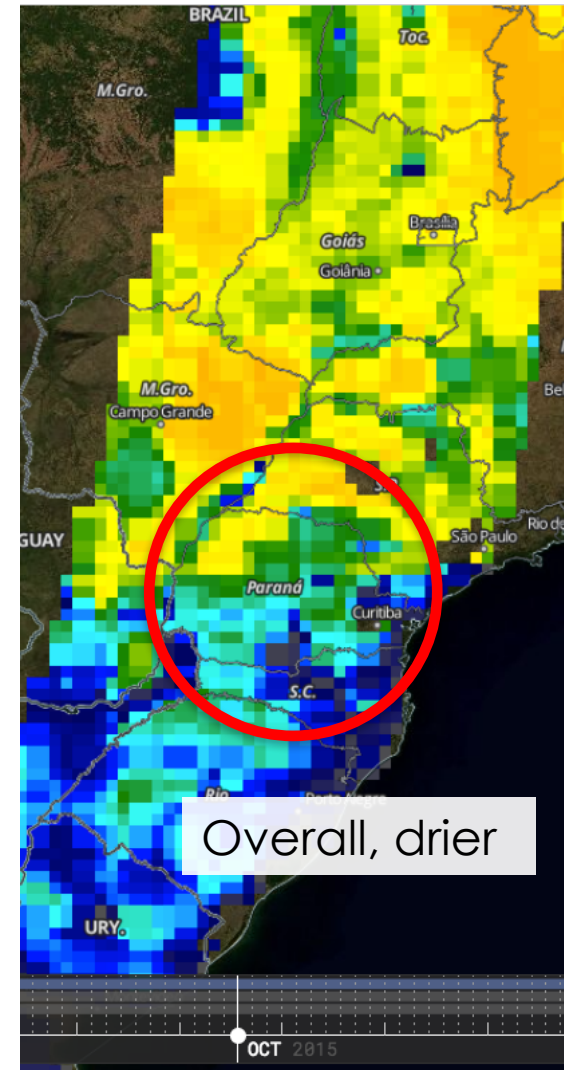


A Quick Comparison of Soil Moisture Across Time...



A Quick Comparison of Soil Moisture Across Time...

You can use the **Share this Map** option to copy links for the two days that you would like to compare and view them in browser windows placed side by side for a quick visualization of the soil moisture differences between the two dates



Downloading from Worldview:

The screenshot displays the NASA Worldview web application. The left sidebar contains a 'Data' tab, highlighted with a red arrow and the text 'Switch to the Data tab'. Below this, a list of data products is shown, with 'SMAP L3 RADIOMETER GLOBAL DAILY 36 KM EASE-GRID SOIL MOISTURE' selected. A 'Download Selected Data' button is at the bottom of the list. A 'Select data' dialog box is open, showing a date range of '2015-08-08: 00:00-23:59 UTC' with a checked checkbox, indicated by a red arrow and the text 'Tick this box to select this day's data'. The main map area shows a satellite view of South America with a color-coded overlay representing soil moisture data. The bottom of the interface features a timeline for August 2015, a scale bar (500 km / 200 mi), and a coordinate display (-12.3031°, -84.5355° EPSG:4326).



Downloading from Worldview:

The screenshot shows the NASA Worldview interface with a map of South America displaying soil moisture data. A text box with a red arrow pointing to the date selector at the bottom left says: "Advance to the next day of Soil Moisture data and tick the box – notice that the data panel indicates “2 SELECTED”". Another red arrow points to a "Select data" dialog box that shows a checked checkbox for the date "2015-12-14: 00:00-23:59 UTC". The left sidebar shows the "Data" tab selected, with "SMAP L3 RADIOMETER GLOBAL DAILY 36 KM EASE-GRID SOIL MOISTURE" listed as "2 SELECTED". Below it, other data layers are listed, some marked as "NOT AVAILABLE FOR DOWNLOAD". The bottom of the interface shows a timeline for December 2015, with the date "2015 DEC 14" highlighted.

NASA WORLDVIEW

Layers Events Data

SMAP L3 RADIOMETER GLOBAL DAILY 36 KM EASE-GRID SOIL MOISTURE 2 SELECTED

Soil Moisture 36 km (L3, Passive, Day) SMAP / Radiometer

Corrected Brightness Temperature (L Passive, H Polarization) SMAP / Radiometer

Corrected Brightness Temperature (L Passive, V Polarization) SMAP / Radiometer

NOT AVAILABLE FOR DOWNLOAD (?)

Blue Marble (August 2004) MODIS / NASA Earth Observatory

Coastlines / Borders / Roads © OpenStreetMap (license), Natural Earth

Place Labels © OpenStreetMap (license), Natural Earth

Download Selected Data

Select data

☒ 2015-12-14: 00:00-23:59 UTC

2015 DEC 14

SEP 2015 OCT 2015 NOV 2015 DEC 2015

DAYS MONTHS YEARS



Downloading from Worldview:

Clicking on individual file names (in blue) in the top part of the box will download just that file to your machine. Depending on your browser, you may need to hover and right click on the .qa and .xml files and choose the **Save link as** option to save them to your machine rather than have them just open in a separate window or tab.

Click the “Download Selected Data” button and this dialogue pops up. You can remove files from your order and explore your download options.

Clicking on the bottom of the box on either **List of Links** or **List of cURL Commands** will open a new tab or window in your browser with instructions on how to use these options (see next slide)



Downloading from Worldview

Download Links

```
https://n5eil01u.ecs.nsidc.org/DP4/SMAP/SPL3SMP.004/2015.08.08/SMAP_L3_SM_P_20150808_R14010_001.h5  
https://n5eil01u.ecs.nsidc.org/DP4/SMAP/SPL3SMP.004/2015.12.14/SMAP_L3_SM_P_20151214_R14010_001.h5
```

Using [wget](#) to Bulk Download Your Data

- 1) Copy the links above and paste into a text document. Save it as "links.txt"
- 2) Execute the following command to download all of your requested files:

```
wget --input-file=links.txt
```

Using [Free Download Manager](#) for Windows to Bulk Download Your Data

- 1) Copy the Download Links above to your clipboard
- 2) In Free Download Manager, go to File | Import | Import list of URLs from clipboard

Download Commands

Using [curl](#) to Bulk Download Your Data

Mac OS X / Linux

- 1) Copy the Download Commands above and paste into a text document. Save it as "download.sh"
- 2) Execute the following command to download all of your requested files:

```
sh ./download.sh
```

Windows

- 1) Copy the Download Commands above and paste into a text document. Save it as "download.bat"
- 2) Execute the following command to download all of your requested files:

```
download.bat
```



Search & Access SMAP Data from Earthdata Search

The screenshot shows the Earthdata Search homepage. A search bar at the top contains the text "SPL3SMP". To the left is a sidebar with "Browse Collections", "Features", "Keywords", and "Organizations". The main area displays a world map with a search results pane on the left showing "2 Matching Collections". Two collection entries are listed: "SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004" and "SMAP Enhanced L3 Radiometer Global Daily 9 km EASE-Grid Soil Moisture V001". Both entries show "919 Granules" and "2015-03-31 ongoing". Annotations with red arrows point to the "Earthdata Login" button, the "Earthdata Log" button, the "Add" (+) button for the first collection, and the "Add" (+) button for the second collection.

EARTHDATA Search

Find a DAAC

SPL3SMP

Click to login to Earthdata

Keyword search and filter options

Click to submit help request or feedback

2 Matching Collections

Only include collections with granules Include non-EOSDIS collections

Tip: Add + collections to your project to compare and download their data. Learn More

Report a metadata problem

No image available

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004

919 Granules • 2015-03-31 ongoing • Daily global composite of up-to 30 half-orbit L2_SM_P soil moisture estimates based on radiometer brightness temperature measurements acquired by the SMAP radiometer during ascending and descending half-orbits at approximately 6 PM and 6 AM local solar time.

MAP IMAGERY SUBSETTING SPL3SMP v004 - NSIDC

No image available

SMAP Enhanced L3 Radiometer Global Daily 9 km EASE-Grid Soil Moisture V001

919 Granules • 2015-03-31 ongoing • Daily global composite of up-to 30 half-orbit L2_SM_P soil moisture estimates based on radiometer brightness temperature measurements acquired by the SMAP radiometer during ascending and descending half-orbits at approximately 6 PM and 6 AM local solar time.

SUBSETTING SPL3SMP_E v001 - NSIDC

Add this collection to a project

v 1.53.5 • Search Time: 0.2s • NASA Official: Stephen Berrick • FOIA • NASA Privacy Policy • USA.gov

Earthdata Access: A Section 508 accessible alternative



Search & Access SMAP Data from Earthdata Search

The screenshot shows the Earthdata Search web application. The left sidebar contains navigation links for 'Browse Collections', 'Features' (with checkboxes for Map Imagery, Near Real Time, and Subsetting Services), 'Keywords', and 'Organizations'. The main area features a map of the Atlantic Ocean and surrounding landmasses. A search bar at the top left contains the text 'SPL3SMP'. Below the map, a list of search results is displayed, including 'SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004' and 'SMAP Enhanced L3 Radiometer Global Daily 9 km EASE-Grid Soil Moisture V001'. Red arrows point from text annotations to specific UI elements: 'South Polar Stereographic' points to the map's projection settings; 'Geographic (equirectangular)' points to the map's coordinate system; 'North Polar Stereographic' points to the map's projection settings; 'Search by spatial coordinate' points to the search bar; 'Search by spatial rectangle' points to the map's search tools; 'Search by spatial polygon' points to the map's search tools; and 'Display the map's base layer options' points to the map's base layer selector.

Find a DAAC ▾

EARTHDATA Search

Browse Collections

Features

- Map Imagery
- Near Real Time
- Subsetting Services

Keywords

Organizations

SPL3SMP

South Polar Stereographic

Geographic (equirectangular)

North Polar Stereographic

Search by spatial coordinate

Search by spatial rectangle

Search by spatial polygon

Display the map's base layer options

2 Matching Collections

☒ Only include collections with granules ☒ Include non-EOSDIS collections

Tip: Add + collections to your project to compare and download their data. [Learn More](#)

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004

No image available

919 Granules • 2015-03-31 ongoing • Daily global composite of up-to 30 half-orbit L2_SM_P soil moisture estimates based on radiometer brightness temperature measurements acquired by the SMAP satellite.

MAP IMAGERY SUBSETTING SPL3SMP v004 - NSIDC

SMAP Enhanced L3 Radiometer Global Daily 9 km EASE-Grid Soil Moisture V001

No image available

919 Granules • 2015-03-31 ongoing • Daily global composite of up-to 30 half-orbit L2_SM_P soil moisture estimates based on radiometer brightness temperature measurements acquired by the SMAP satellite.

SUBSETTING SPL3SMP_E v001 - NSIDC

v 1.53.5 • Search Time: 0.2s • NASA Official: Stephen Berrick • FOIA • NASA Privacy Policy • USA.gov

Earthdata Access: A Section 508 accessible alternative



Search & Access SMAP Data from Earthdata Search

The screenshot shows the Earthdata Search web application. The search bar at the top contains the text "SPL3SMP". Below the search bar, there are three red arrows pointing to specific icons: a clock icon for temporal filters, a rectangle icon for spatial filters, and an eraser icon for deleting filters. A fourth red arrow points to the "Edit or delete spatial filter bounds" button in the bottom right corner of the map area. The left sidebar shows the "Browse Collections" section with filters for "Map Imagery", "Near Real Time", and "Subsetting Services". The main content area displays "2 Matching Collections" and lists two SMAP data products: "SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004" and "SMAP Enhanced L3 Radiometer Global Daily 9 km EASE-Grid Soil Moisture V001". Both products show "919 Granules" and "2015-03-31 ongoing" status. The bottom of the page includes a footer with version information and a link to the Earthdata Access A Section 508 accessible alternative.

EARTHDATA Search

Find a DAAC

SPL3SMP

Display temporal & spatial filters once set

Erase selection or filters

Crop data by polygon, point, rectangle, file, or grid coordinates

Edit or delete spatial filter bounds

2 Matching Collections

☒ Only include collections with granules ☒ Include non-EOSDIS collections
Tip: Add + collections to your project to compare and download their data. [Learn More](#)

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004
919 Granules • 2015-03-31 ongoing • Daily global composite of up-to 30 half-orbit L2_SM_P soil moisture estimates based on radiometer brightness temperature measurements acquired by the SMAP radiometer during ascending and descending half-orbits at approximately 6 PM and 6 AM local solar time.
[MAP IMAGERY](#) [SUBSETTING](#) [SPL3SMP v004 - NSIDC](#)

SMAP Enhanced L3 Radiometer Global Daily 9 km EASE-Grid Soil Moisture V001
919 Granules • 2015-03-31 ongoing • Daily global composite of up-to 30 half-orbit L2_SM_P soil moisture estimates based on radiometer brightness temperature measurements acquired by the SMAP radiometer during ascending and descending half-orbits at approximately 6 PM and 6 AM local solar time.
[SUBSETTING](#) [SPL3SMP_E v001 - NSIDC](#)

v 1.53.5 • Search Time: 0.2s • NASA Official: Stephen Berrick • FOIA • NASA Privacy Policy • USA.gov

[Earthdata Access: A Section 508 accessible alternative](#)



Search & Access SMAP Data from Earthdata Search

If you don't already have an Earthdata Login, you will have to register for one before ordering data

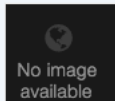
Once you've logged in, you'll see that the interface looks slightly different. You can now save projects, view other projects you've saved, and look through your order history

Click to save this setup as a project

Review contact information, recent orders, saved projects, or logout of your account

2 Matching Collections

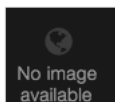
☒ Only include collections with granules ☒ Include non-EOSDIS collections
You have 1 collection in your current Project



SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004

919 Granules • 2015-03-31 ongoing • Daily global composite of up-to 30 half-orbit L2_SM_P soil moisture estimates based on radiometer brightness temperature measurements acquired by the SMAP radiometer during ascending and descending half-orbits at approximately 6 PM and 6 AM local solar time.

MAP IMAGERY SUBSETTING SPL3SMP v004 - NSIDC



SMAP Enhanced L3 Radiometer Global Daily 9 km EASE-Grid Soil Moisture V001

919 Granules • 2015-03-31 ongoing • Daily global composite of up-to 30 half-orbit L2_SM_P soil moisture estimates based on radiometer brightness temperature measurements acquired by the SMAP radiometer during ascending and descending half-orbits at approximately 6 PM and 6 AM local solar time.

SUBSETTING SPL3SMP_E v001 - NSIDC

Clicking the – symbol will remove this collection from your dataset



Set Temporal Search Filter

1. Login
2. Use the “Recurring?” option to limit the granules (files) returned to the dates between Aug 8 and Dec 14, 2015

The screenshot displays the EarthData Search web application. A search for 'SPL3SMP' has been performed. A modal window is open, showing the search criteria: Start date '08-08 00:00:00', End date '12-14 23:59:59', and the 'Recurring?' checkbox is checked. The 'Year Range' is set to '2015 - 2015'. A red arrow points to the 'Apply Filter' button. Below the modal, the results show '2 Matching Collections'. The first collection is 'SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004', which has 129 granules. The second collection is 'SMAP Enhanced L3 Radiometer Global Daily 9 km EASE-Grid Soil Moisture V001', which also has 129 granules. A red arrow points to the 'SUBSETTING' button for the first collection. The interface includes a sidebar with navigation options like 'Browse Collections', 'Features', 'Keywords', and 'Organizations'. The footer shows the version 'v 1.53.5' and search time '0.4s'.



Set Temporal Search Filter

The screenshot shows the NASA EarthData Search interface. The search bar contains 'SPL3SMP'. Below it, the temporal search filter is set to 'Start: 08-08 00:00:00 Stop: 12-14 23:59:59 Range: 2015 - 2015'. A red arrow points to this filter. A text box says 'Notice the temporal search details display'. Below the search bar, it shows '2 Matching Collections'. Two checkboxes are checked: 'Only include collections with granules' and 'Include non-EOSDIS collections'. Below these, two collections are listed: 'SMAP L3 Radiometer Global Daily 36 km E...' and 'SMAP Enhanced L3 Radiometer Global Daily 36 km E...'. Both show '129 Granules'. A red arrow points to the '129 Granules' text. A text box says 'Notice the granule count has dropped from 919 to 129 granules'. Another text box says 'Set the spatial search filter over Paraná, using the rectangle option'. The interface also includes a sidebar with 'Browse Collections', 'Features', 'Keywords', and 'Organizations'. The footer shows 'v 1.53.5', 'Search Time: 0.4s', and 'NASA Official: Stephen Berrick'.

Notice the temporal search details display

Notice the granule count has dropped from 919 to 129 granules

Set the spatial search filter over Paraná, using the rectangle option



Set Spatial Search Filter

The screenshot displays the NASA Earthdata Search web application. The interface includes a search bar at the top with the text "Type any topic, collection, or place name". Below the search bar, the temporal search criteria are set to "Start: 08-08 00:00:00 Stop: 12-14 23:59:59 Range: 2015 - 2015". The spatial search filter is defined by a rectangle with coordinates: "Rectangle: SW: -26.82421875, -55.05461 NE: -22.5703125, -47.77734". The map shows a region of South America, specifically Brazil and Paraguay, with a red rectangle highlighting the search area. The left sidebar contains navigation options like "Browse Collections", "Features", and "Keyword". The bottom section lists search results, including "SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004" and "SMAP Enhanced L3 Radiometer Global Daily 9 km EASE-Grid Soil Moisture V001".

With the spatial search set, the coordinates are displayed along with the details of my temporal search criteria

Add the current project to your collection and view it. This is optional – you don't have to use the project feature to order data



Set Spatial Search Filter

EARTHDATA Search

Find a DAAC ▾

Type any topic, collection, or place name

Start: 08-08 00:00:00 Stop: 12-14 23:59:59 Range: 2015 - 2015

Rectangle: SW: -26.82421875,-55.05461 NE: -22.5703125,-47.77734

PARAGUAY

When you click on the text that says **8 Granules** the pane changes to a new view displaying all 8 granules

2 Matching Collections

☒ Only include collections with granules ☒ Include non-EOSDIS collections

You have 1 collection in your current Project

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004

2 Granules • 2015-03-31 ongoing • Daily global composite of up-to 30 half-orbit L2_SM_P soil moisture estimates based on radiometer brightness temperature measurements acquired by the SMAP radiometer during ascending and descending half-orbits at approximately 6 PM and 6 AM local solar time.

MAP IMAGERY SUBSETTING SPL3SMP v004 - NSIDC

SMAP Enhanced L3 Radiometer Global Daily 9 km EASE-Grid Soil Moisture V001

129 Granules • 2015-03-31 ongoing • Daily global composite of up to 30 half-orbit L2_SM_P soil moisture estimates based on radiometer brightness temperature measurements acquired by the SMAP radiometer during ascending and descending half-orbits at approximately 6 PM and 6 AM local solar time.

SUBSETTING SPL3SMP_E v001 - NSIDC

Remove collection from the current project

View collection details

Report a metadata problem

v 1.53.5 • Search Time: 0.3s • NASA Official: Stephen Berrick • FOIA • NASA Privacy Policy • USA.gov

Earthdata Access: A Section 508 accessible alternative



Granules Listed

Click the download icon to download individual files or the X symbol to delete a file from the list. Because there's a large number of files we aren't interested in, we could click on the two dates we're interested in and do a direct download. For this example, we'll delete all the granules we aren't interested in

Notice that clicking on a granule name displays the extent of the file on the map

Download single granule data

View granule details

Remove granule

Configure and download single granule data

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004

Showing 20 of 129 matching granules

Granule Name	Start Date	Stop Date
SMAP_L3_SM_P_20151214_R14010_001.h5	2015-12-14 00:00:00	2015-12-14 23:59:59
SMAP_L3_SM_P_20151212_R14010_001.h5	2015-12-12 00:00:00	2015-12-12 23:59:59
SMAP_L3_SM_P_20151211_R14010_001.h5	2015-12-11 00:00:00	2015-12-11 23:59:59
SMAP_L3_SM_P_20151210_R14010_001.h5	2015-12-10 00:00:00	2015-12-10 23:59:59
SMAP_L3_SM_P_20151209_R14010_001.h5	2015-12-09 00:00:00	2015-12-09 23:59:59

Download Data

Report a metadata problem

Search Time: 0.3s

MONTH

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004

May Jun Jul Aug Sep Oct Nov Dec Jan 2016 Feb Mar Apr

v 1.53.5 • Search Time: 0.5s • NASA Official: Stephen Berrick • FOIA • NASA Privacy Policy • USA.gov

Earthdata Access: A Section 508 accessible alternative



Granules Culled and Ready to Customize and Order

3. Click the download icon to download individual files

The screenshot displays the NASA EarthData interface. At the top, there's a search bar and a map of South America. A green rectangle on the map indicates the selected region in Brazil. Below the map, the search results show two granules: 'SMAP_L3_SM_P_20151214_R14010_001.h5' and 'SMAP_L3_SM_P_20150808_R14010_001.h5'. A red arrow points to the 'Download Data' button in the top right corner. The bottom of the interface features a timeline for the month of August 2015.

Find a DAAC

Type any topic, collection, or place name

Start: 08-08 00:00:00 Stop: 12-14 23:59:59 Range: 2015 - 2015

Rectangle: SW: -26.82421875,-55.0546 NE: -22.5703125,-47.77734

Back to Collections

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004

Showing 2 of 2 matching granules Sort by: Start Date, Newest first Granule Search: Search Single or Multiple Granule IDs... Granule excluded, Undo

Granule ID	Start Date	End Date
SMAP_L3_SM_P_20151214_R14010_001.h5	2015-12-14 00:00:00	2015-12-14 23:59:59
SMAP_L3_SM_P_20150808_R14010_001.h5	2015-08-08 00:00:00	2015-08-08 23:59:59

MONTH

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004

May Jun Jul Aug Sep Oct Nov Dec Jan 2016 Feb Mar Apr

v 1.53.5 Search Time: 0.3s NASA Official: Stephen Berrick • FOIA • NASA Privacy Policy • USA.gov

Earthdata Access: A Section 508 accessible alternative



Customizing My Download

4. Select **Customize Product**
5. Set the Output file to **GeoTIFF**
6. The **Spatial Subsetting** will populate with the coordinates used in your spatial search criteria
7. Under **Band Subsetting**, click to deselect all options
8. Choose the parameters you want

☐ include metadata and processing history


Reformat Output (Optional)

Output File Format:

Spatial Subsetting (Optional)

☒ Enter bounding box

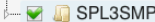
North:
West:
East:
South:



Projection Options

Re-projection Options:

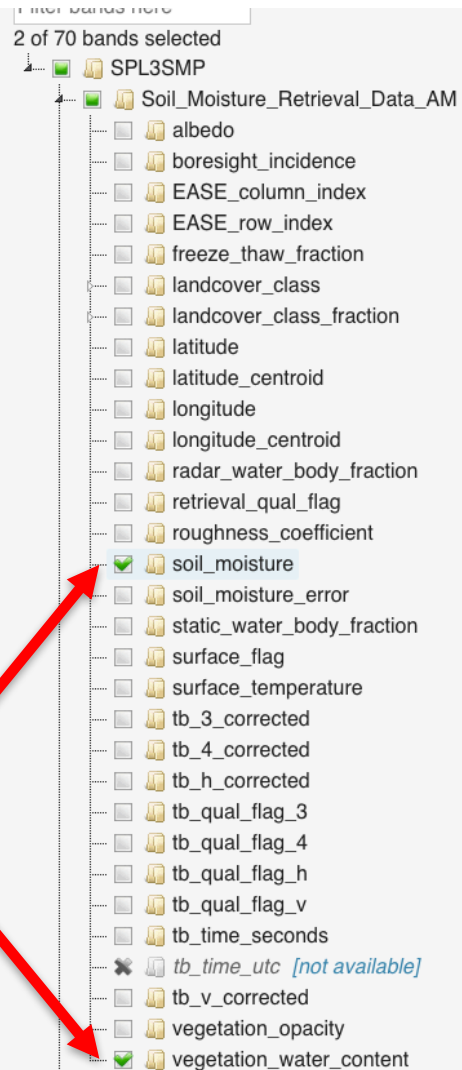
Band Subsetting (Optional)

Choose Bands:
69 of 70 bands selected





Customizing My Download



Choose the
parameters you
want





Submitting a SMAP Request

 EARTHDATA

Find a DAAC ▾

⌕ Back to Search Session

Data Access

Review and select service options for your data prior to download

1

SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004

2

Contact Information & Submit

Elizabeth Hook (elizabeth.a.hook@nasa.gov)

Organization: NASA ARSET

Country: United States

Affiliation: Government

Study Area: Other

User Type: Public User

Edit Profile in Earthdata Login ↗

Cancel

Submit



Retrieving a SMAP Output

The screenshot shows the Earthdata website interface. At the top, there's a header with the NASA Earthdata logo and a 'Find a DAAC' dropdown. Below the header, there's a navigation bar with a 'Back to Data Access Options' link. The main content area is divided into two sections. The top section, titled 'The following collections are being processed', contains a list of collections. One collection, 'SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004', is marked as 'Complete'. Below this, a message states: 'Your request is complete and can be downloaded using the following urls:'. Two URLs are listed: <https://n5eil01u.ecs.nsidc.org/esir/50000000041518.html> and <https://n5eil01u.ecs.nsidc.org/esir/50000000041518.zip>. The bottom section, titled 'Next Steps', contains three links: 'Back to Earthdata Search Results', 'Start a New Earthdata Search Session', and 'View Your Download Status & History'. A red arrow points from the 'Complete' status to the 'Request status' text box. Another red arrow points from the 'Request status' text box to the first URL.

You can click the html link to view request details or click the zip file to download everything at once

The following collections are being processed

When the data becomes available, an email containing download links will be sent to the address you provided.

- **SMAP L3 Radiometer Global Daily 36 km EASE-Grid Soil Moisture V004** Complete

Your request is complete and can be downloaded using the following urls:

<https://n5eil01u.ecs.nsidc.org/esir/50000000041518.html>

<https://n5eil01u.ecs.nsidc.org/esir/50000000041518.zip>

Request status – when complete, URLs are displayed

Next Steps

- [Back to Earthdata Search Results](#)
- [Start a New Earthdata Search Session](#)
- [View Your Download Status & History](#)

v 1.53.5 • NASA Official: Stephen Berrick • FOIA • NASA Privacy Policy • USA.gov

Earthdata Access: A Section 508 accessible alternative



Retrieving my SMAP Output:

When you choose to reformat output to GeoTIFF, you will receive one tif per band selected for each granule in your request

9. Download the soil moisture tif images

Output files for request id: 5000000040524

Click on the following link for a Request Summary:

[requestSummary.txt](#)

Retrieve list of files as a text listing (no html):

[5000000040524.txt](#)

Download all files in a single Zip file:

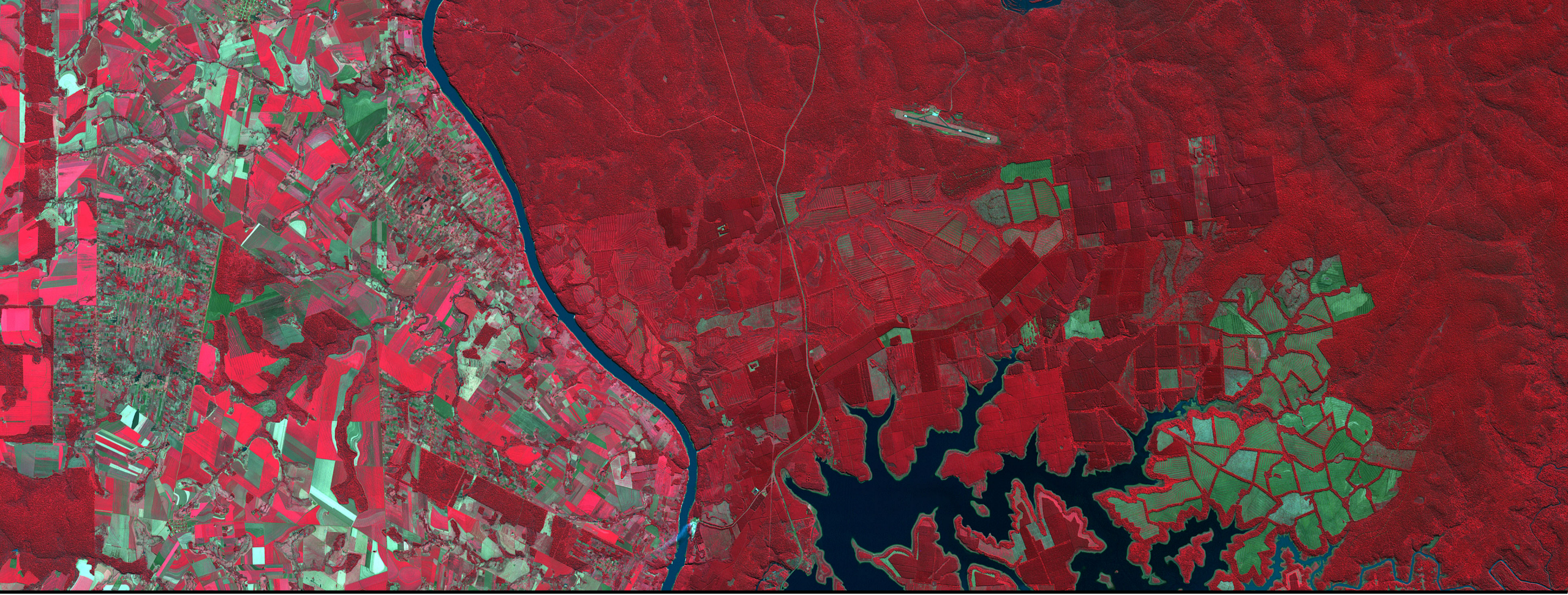
[5000000040524.zip](#)

Click on the following links for generated output files:

For Input Granule: 105619863

[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM albedo 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM boresight incidence 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM EASE column index 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM EASE row index 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM freeze thaw fraction 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM landcover class Bands 1 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM landcover class Bands 2 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM landcover class Bands 3 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM landcover class fraction Bands 1 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM landcover class fraction Bands 2 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM landcover class fraction Bands 3 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM latitude 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM latitude centroid 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM longitude 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM longitude centroid 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM radar water body fraction 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM retrieval qual flag 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM roughness coefficient 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM soil moisture 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM soil moisture error 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)
[SMAP L3 SM P 20150522 R14010 001 Soil Moisture Retrieval Data AM static water body fraction 13b20a7e.tif](#) (<1 MB, SCIENCE, image/tiff)





SMAP Data Analysis

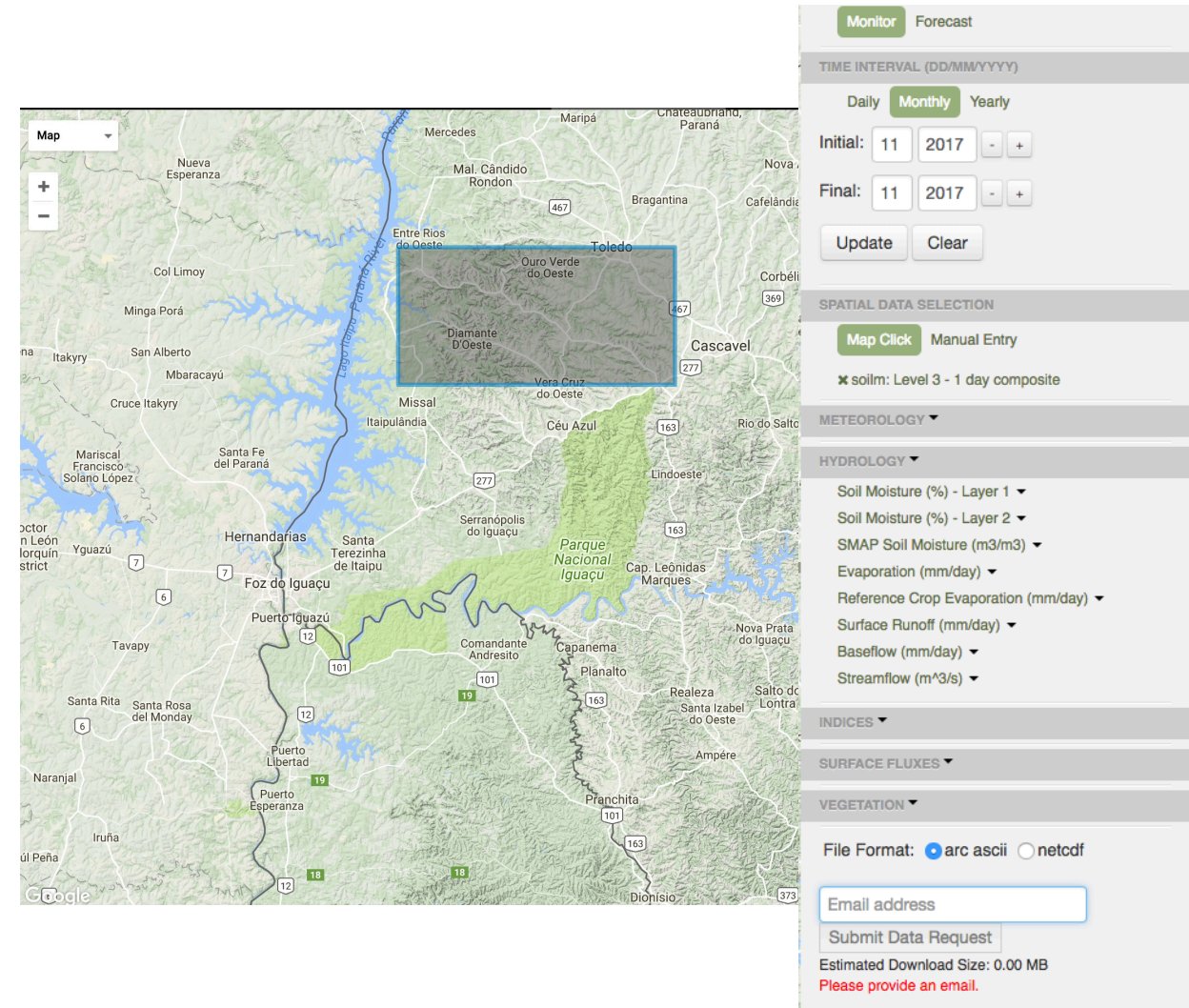
Extracting SMAP Soil Moisture

1. Go to the U.S. Flood and Drought Monitor tool from Princeton University:
 - <http://stream.princeton.edu/LAFDM/WEBPAGE/interface.php?locale=en>
 - This is the most direct way to extract SMAP soil moisture values



Specifying Parameters

2. In the upper-right window, select **Spatial Data**
3. Under **Time Interval**, select **monthly**. Specify **Jan. 2016**
4. Draw a box over the watershed
5. Under **Hydrology**, select **SMAP soil moisture > Level 3-1day composite**
6. For **File Format**, select **arc ascii**
7. Specify your email and click **Submit Data Request**



The screenshot displays the NASA Earth Data portal interface. On the left, a map shows the Iguazu region with a blue box highlighting a specific watershed area. The right panel contains configuration options:

- Monitor** (selected) / Forecast
- TIME INTERVAL (DD/MM/YYYY)**: Daily (selected), Monthly, Yearly. Initial: 11 2017, Final: 11 2017. Buttons: Update, Clear.
- SPATIAL DATA SELECTION**: Map Click (selected), Manual Entry. Selection: ☒ soilm: Level 3 - 1 day composite.
- METEOROLOGY** (dropdown)
- HYDROLOGY** (dropdown):
 - Soil Moisture (%) - Layer 1
 - Soil Moisture (%) - Layer 2
 - SMAP Soil Moisture (m3/m3) (selected)
 - Evaporation (mm/day)
 - Reference Crop Evaporation (mm/day)
 - Surface Runoff (mm/day)
 - Baseflow (mm/day)
 - Streamflow (m^3/s)
- INDICES** (dropdown)
- SURFACE FLUXES** (dropdown)
- VEGETATION** (dropdown)
- File Format**: ☒ arc ascii, ☐ netcdf.
- Email address**: Input field.
- Submit Data Request** button.
- Estimated Download Size: 0.00 MB.
- Please provide an email.



Opening the File

8. Open the text file with Excel
 - The results contain the average soil moisture for the month of Jan. 2016 for the pixels within the rectangle specified
9. Repeat the same extraction for Jan 2017, Feb 2016, and Feb 2017

